

79132

580,246

## LIST OF PRIOR ART CITED BY APPLICANT

(Use several sheets if necessary)

APPLICANT

Donald R. Huffman, et al

FILING DATE

September 10, 1990

GROUP

## U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
501C	AA	4 1 3 2 6 7 1	1/2/79	Deininger et al.	252	445	
	AB						
	AC						
	AD						
	AE						
	AF						
	AG						
	AH						
	AI						
	AJ						
	AK						

## FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION
							YES NO
	AL						
	AM						
	AN						
	AO						
	AP						

## OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)

501C	AR	Williams, Close packing of spheres, J. Chem. Phys. 87(7), October 1, 1987 pages 4206-4211
	AS	<del>Rodzinski, et al. C<sub>60</sub> (g) AND C<sub>70</sub> (g): A COMPUTATIONAL STUDY OF THE PRESSURE AND TEMPERATURE DEPENDENCE OF THEIR POPULATIONS, Carbon Vol. 25, No. 6, pp. 747-750 1987</del>
501C	AT	Larsson, et al., OPTICAL SPECTRUM OF THE ICOSAHEDRAL C <sub>60</sub> - "FOLLENE-60", Chemical Physical Letters, Volume 137, number 6, July 3, 1987, pp. 501-503

EXAMINER

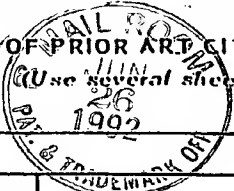
H. H. H. H. H.

DATE CONSIDERED

8/17/92

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

LIST OF PRIOR ART CITED BY APPLICANT  
(Use several sheets if necessary)



ATTY. DOCKET NO.

7913Z

SERIAL NO.

580,246; 59

APPLICANT  
Donald R. Huffman, et al.

FILING DATE

September 10, 1990

GROUP

U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	AA						
	AB						
	AC						
	AD						
	AE						
	AF						
	AG						
	AH						
	AI						
	AJ						
	AK						

FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
							YES	NO
	AL							
	AM							
	AN							
	AO							
	AP							

OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)

56-K	AR		Kovacevic, et al. On the Hybridization in Some Archimedean Carbon Clusters, International Journal of Quantum Chemistry Symposium 21, (1987) pp. 589-593
	AS		Rosen, et al., Optical Spectrum of the Icosahedral C <sub>60</sub> -"Bollene-60": A Challenge for Laser Spectroscopy, Laser Spectroscopy VIII, Proceedings of the Eighth International Conference, June, 1987, pp. 250-253
	AT		

EXAMINER

*E. H. H. H.*

DATE CONSIDERED

8/17/92

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

## LIST OF PRIOR ART CITED BY APPLICANT

(Use several sheets if necessary)

ATTY. DOCKET NO.

7913Z

SERIAL NO.

580,246

12:00

APPLICANT

Donald R. Huffman, et al.

FILING DATE

September 10, 1990

GROUP

## U.S. PATENT DOCUMENTS

EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
AA						
AB						
AC						
AD						
AE						
AF						
AG						
AH						
AI						
AJ						
AK						

## FOREIGN PATENT DOCUMENTS

	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
						YES	NO
AL							
AM							
AN							
AO							
AP							

## OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)

56-1	AR	Elser, et al., Magnetic behavior of icosahedral C <sub>60</sub> , Physical Review A General Physics Third Series, Volume 36, Number 10, November 15, 1987, pp. 4579-4585
56-1	AS	Fowler, et al., The Leapfrog Principle: A Rule for Electron Counts of Carbon Clusters, J. Chem. Soc., Chem. Commun., 1987 pp. 1403-1405
56-1	AT	Almlof, et al., Theoretical Methods and Results for Electronic Structure Calculations on Very Large Systems Carbon Clusters, ACS Symposium Series 353, 1987, pp. 35-48

EXAMINER

*E. H. H. H.*

DATE CONSIDERED

8/17/92

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

**LIST OF PRIOR ART CITED BY APPLICANT**  
(Use several sheets if necessary)

ATTY. DOCKET NO.

7913Z

SERIAL NO.

580,246: 53

APPLICANT

Donald R. Huffman, et al.

FILING DATE

September 10, 1990

GROUP

**U.S. PATENT DOCUMENTS**

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	AA						
	AB						
	AC						
	AD						
	AE						
	AF						
	AG						
	AH						
	AI						
	AJ						
	AK						

**FOREIGN PATENT DOCUMENTS**

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
							YES	NO
	AL							
	AM							
	AN							
	AO							
	AP							

**OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)**

56-K	AR	Schulman, et al., Symmetrical Clusters of Carbon Atoms: The C <sub>24</sub> and C <sub>60</sub> Molecules, Chemical Physics Letters, Volume 141, number 1,2, October 30, 1987 pp. 45-48
56-K	AS	Wales, Closed-Shell Structures and the Building Game, Chemical Physics Letters, Volume 141, number 6, November 27, 1987, pp. 478-484
56-K	AT	McKee, et al., Calculated Properties of C <sub>60</sub> Isomers and Fragments, Journal of Molecular Structure (Theochem.), 153 (1987) pp. 75-84

EXAMINER

*[Signature]*

DATE CONSIDERED

8/17/92

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

#12  
attach  
01/580246

Sheet 5 of 56

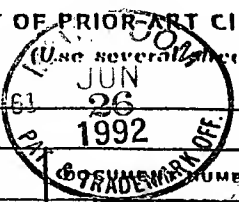
Form PTO-1449  
REV. 7-801

U.S. DEPARTMENT OF COMMERCE  
PATENT AND TRADEMARK OFFICE

ATTY. DOCKET NO.  
7913Z

SERIAL NO.  
580,246

LIST OF PRIOR ART CITED BY APPLICANT



(Use several sheets if necessary)

APPLICANT  
Donald R. Huffman, et al.

FILING DATE  
September 10, 1990

GROUP

U.S. PATENT DOCUMENTS

EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
AA						
AB						
AC						
AD						
AE						
AF						
AG						
AH						
AI						
AJ						
AK						

FOREIGN PATENT DOCUMENTS

	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES NO
AL						
AM						
AN						
AO						
AP						

OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)

501C	AR	Randic, et al., On the Aromatic Stability of a Conjugated C <sub>60</sub> Cluster, Croatica Chemical ACTA 60 (4) 1987 pp. 595-604
	AS	Bochvar, et al., Problems in the Structural Chemistry of Crystalline Carbon, Sov. Sci. Rev. B. Chem., Vo. 9, 1987, pp. 483-527
501C	AT	Schmalz, et al., Elemental Carbon Cages, J. Am. Chem. Soc. 1988, 110, pp. 1113-1127

EXAMINER  
*H. Schubert*

DATE CONSIDERED  
8/17/92

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

LIST OF PRIOR ART CITED BY APPLICANT  
(Use several sheets if necessary)

ATTY. DOCKET NO.

7913Z

SERIAL NO.

580,246

APPLICANT

Donald R. Huffman et al.

FILING DATE

September 10, 1990

GROUP

## U.S. PATENT DOCUMENTS

EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
AA						
AB						
AC						
AD						
AE						
AF						
AG						
AH						
AI						
AJ						
AK						

## FOREIGN PATENT DOCUMENTS

DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION
					YES NO
AL					
AM					
AN					
AO					
AP					

## OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)

SG-K	AR	O'Brien, et al., Photophysics of buckminsterfullerene and other carbon cluster ions, J. Chem. Phys. 88(1), January 1, 1988, pp. 220-230
SG-K	AS	Rudzinski, et al., Computational Study of Relative Stabilities of $C_{60}(I_h)$ and $C_{70}(D_{5h})$ Gas- Phase Clusters, Thermochimica Acta, 125 (1988) pp. 155-162
SG-K	AT	Fowler, et al., Systematics of Bonding in non-icosahedral carbon clusters, Theor Chim Acta (1988) 73: pp. 1-26

EXAMINER

DATE CONSIDERED

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

LIST OF PRIOR ART CITED BY APPLICANT

(Use several sheets if necessary)

ATTY. DOCKET NO.

7913Z

SERIAL NO.

580,246

APPLICANT

Donald R. Huffman, et al.

FILING DATE

September 10, 1990

GROUP

U.S. PATENT DOCUMENTS

EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
AA						
AB						
AC						
AD						
AE						
AF						
AG						
AH						
AI						
AJ						
AK						

FOREIGN PATENT DOCUMENTS

GENERAL INDEX DOCUMENTS														
		DOCUMENT NUMBER							DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
													YES	NO
	AL													
	AM													
	AN													
	AO													
	AP													

OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)

S&K	AR	Negri, et al., Quantum-Chemical Investigation of Franck-Condon and Jahn-Teller Activity in the Electronic Spectra of Buckminsterfullerene, Chemical Physics Letters, Vol. 144, No. 1, February 12, 1988, pp. 31-36
	AS	
S&K	AT	Leger, et al., Remarkable candidates for the carrier for the diffuse interstellar bands: C <sub>60</sub> <sup>+</sup> and other polyhedral carbon ions, Astron. Astrophys., 203, (1988) pp. 145-148

EXAMINER

*S. H. Melnick*

DATE CONSIDERED

8/17/92

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

## LIST OF PRIOR ART CITED BY APPLICANT

(Use several sheets if necessary)

APPLICANT

Donald R. Huffman, et al.

FILING DATE

September 10, 1990

GROUP

## U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	AA						
	AB						
	AC						
	AD						
	AE						
	AF						
	AG						
	AH						
	AI						
	AJ						
	AK						

## FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
							YES	NO
	AL							
	AM							
	AN							
	AO							
	AP							

## OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)

56-10	AR	Aihara, et al., Spherical Aromaticity of Buckminsterfullerene, Bull. Chem. Soc. Jpn. 61, (1988) pp. 2657-2659
56-10	AS	Stanton, et al., Normal Vibrational Modes of Buckminsterfullerene, J. Phys. Chem., 1988, 92, pp. 2141-2145
56-10	AT	Balasubramanian, et al., Computer Generation of Spectra of Graphs: Applications to C <sub>60</sub> Clusters and Other Systems, Journal of Computational Chemistry, Vol. 9, No. 4, (1988) pp. 406-415

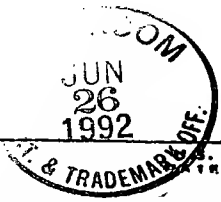
EXAMINER

DATE CONSIDERED

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.



JUN  
26  
1992



Form PTO-1449  
(REV. 7-80)

U.S. DEPARTMENT OF COMMERCE  
PATENT AND TRADEMARK OFFICE

ATTY. DOCKET NO.

7913Z

Sheet 9 of 56

SERIAL NO. 580,246

APPLICANT

Donald R. Huffman, et al.

FILING DATE

September 10, 1990

GROUP

LIST OF PRIOR ART CITED BY APPLICANT

(Use several sheets if necessary)

U.S. PATENT DOCUMENTS

*EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
AA						
AB						
AC						
AD						
AE						
AF						
AG						
AH						
AI						
AJ						
AK						

FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER						DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
												YES	NO
	AL												
	AM												
	AN												
	AO												
	AP												

OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)

5615	AR	Wu, et al., Vibrational Motions of Buckminsterfullerene, Chemical Physical Letters, Volume 137, number 3, June 12, 1987 pp. 291-294
	AS	Slanina, et al., C <sub>60</sub> (g), C <sub>70</sub> (g), Saturated Carbon Vapour and Increase of Cluster Populations with Temperature: A Combined AmI Quantum-Chemical and Statistical-Mechanical Study, Collection Czechoslovak Chem. Commun. Volume 52, (1987) pp. 2831-2839
	AT	

EXAMINER

*Shelvikoff*

DATE CONSIDERED

8/17/92

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

LIST OF PRIOR ART CITED BY APPLICANT  
(Use several sheets if necessary)ATTY. DOCKET NO.  
7913ZSERIAL NO.  
580,246 1112:54APPLICANT  
Donald R. Huffman, et al.FILING DATE  
September 10, 1990

GROUP

## U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	AA						
	AB						
	AC						
	AD						
	AE						
	AF						
	AG						
	AH						
	AI						
	AJ						
	AK						

## FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
							YES	NO
	AL							
	AM							
	AN							
	AO							
	AP							

## OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)

5611	AR	Shibuya, et al., Two Icosahedral Structures for the C <sub>60</sub> Cluster, Chemical Physics Letters, Volume 137, Number 1, May 29, 1987, pp. 13-16
5616	AS	Brown, High Symmetries in Quantum Chemistry, Chemical Physics Letters, Volume 136, Number 2, May 1, 1987, pp. 128-133
5611	AT	Luthi, et al., Ab Initio Studies on the Thermodynamic Stability of the Icosahedral C <sub>60</sub> Molecule "Buckminsterfullerene", Chemical Physics Letters, Vol. 135, Number 4,5, April 10, 1987 pp. 357-360

EXAMINER

DATE CONSIDERED

8/17/92

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

ATTY. DOCKET NO.  
7913Z

SERIAL NO.  
580,246

**LIST OF PRIOR ART CITED BY APPLICANT**  
(Use several sheets if necessary)

APPLICANT  
Donald R. Huffman, et al.

FILING DATE  
September 10, 1990

GROUP

**U.S. PATENT DOCUMENTS**

*EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	AA						
	AB						
	AC						
	AD						
	AE						
	AF						
	AG						
	AH						
	AI						
	AJ						
	AK						

**FOREIGN PATENT DOCUMENTS**

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION
	AL						YES NO
	AM						
	AN						
	AO						
	AP						

**OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)**

56K	AR	Scott, et al., Benzene Ring Contractions at High Temperatures, Evidence from teh Thermal Interconversions of Aoeanthrylene, Aoephenanthrylene, and Fluoranthene , J. Am. Chem. Soc.
	AS	1987, 109, pp. 5461-5465
56K	AT	Hayden, et al., $\pi$ bonding in the icosahedral $C_{60}$ cluster, Physical Review B, Volume 36, Number 9, September 15, 1987, pp. 5010-5015

EXAMINER

*Shalinski*

DATE CONSIDERED

8/17/92

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

## LIST OF PRIOR ART CITED BY APPLICANT

(Use several sheets if necessary)

ATTY. DOCKET NO.

7913Z

SERIAL NO.

580,246 12:54

APPLICANT:

Donald R. Huffman, et al.

FILING DATE

September 10, 1990

GROUP

## U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	AA						
	AB						
	AC						
	AD						
	AE						
	AF						
	AG						
	AH						
	AI						
	AJ						
	AK						

## FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
							YES	NO
	AL							
	AM							
	AN							
	AO							
	AP							

## OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)

56-1	AR		Laszlo, et al., On the Geometrical Structure and UV Spectrum of the Truncated Icosahedral C <sub>60</sub> Molecule, Chemical Physics Letters, Volume 136, number 5, May 15, 1987, pp. 418-422
56-1	AS		Elser, et al., Icosahedral C <sub>60</sub> : an aromatic molecule with a vanishingly small ring current magnetic susceptibility, Nature Vol. 325, February 26, 1987, pp. 792-794
	AT		Coulombeau, et al., Calculs de Proprietes Electroniques et des Frequences Normales de Vibration D'Aggregats Carbones Formant Des Polyedres Reguliers et Semi-Reguliers, Journal de

EXAMINER

Chimie physique, 1987, 24, n 7-8

DATE CONSIDERED

8/17/92

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

**LIST OF PRIOR ART CITED BY APPLICANT**  
(Use several sheets if necessary)

ATTY. DOCKET NO.

7913Z

SERIAL NO.

580,246

APPLICANT

Donald R. Huffman, et al.

FILING DATE

September 10, 1990

GROUP

**U.S. PATENT DOCUMENTS**

EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
AA						
AB						
AC						
AD						
AE						
AF						
AG						
AH						
AI						
AJ						
AK						

**FOREIGN PATENT DOCUMENTS**

		DOCUMENT NUMBER						DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
												YES	NO
	AL												
	AM												
	AN												
	AO												
	AP												

**OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)**

SG 1C	AR	Fowler, How Unusual is C <sub>60</sub> ? Magic Numbers for Carbon Clusters, Chemical Physics Letters, Volume 131, number 6, November 21, 1986, pp. 444-450
SG 1K	AS	Harter, et al., Rovibrational Spectral Fine Structure of Icosahedral Molecules, Chemical Physics Letters, Volume 132, number 4,5, December 19, 1986, pp. 387-392
	AT	

EXAMINER

*[Signature]*

DATE CONSIDERED

8/17/92

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

## LIST OF PRIOR ART CITED BY APPLICANT

(One numeral sheet if necessary)

ATTY. DOCKET NO.

7913Z

SERIAL NO.

580,246

APPLICANT

Donald R. Huffman, et al.

FILING DATE

September 10, 1990

GROUP

## U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	AA						
	AB						
	AC						
	AD						
	AE						
	AF						
	AG						
	AH						
	AI						
	AJ						
	AK						

## FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
							YES	NO
	AL							
	AM							
	AN							
	AO							
	AP							

## OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)

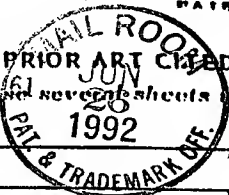
56-K	AR	Marynick, et al., Localized Molecular Orbitals and Electronic Structure of Buckminsterfullerene, Chemical Physics Letters, Volume 132, number 4,5, pp. 383-386 (1986)
56-K	AS	Kataoka, et al., Geometrical Structures and Spectra of Corannulene, and Icosahedral C <sub>60</sub> Tetrahedron, Vol. 42, No. 23, pp. 6437-6442 (1986)
56-K	AT	Haddon, et al., Rehybridization and $\pi$ -Orbital Alignment: The Key to the Existence of Spheroidal Carbon Clusters, Chemical Physics Letters, Volume 131, number 3, pp. 165-169 (1986)

EXAMINER

DATE CONSIDERED

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

**LIST OF PRIOR ART CITED BY APPLICANT**  
(Use several sheets if necessary)



ATTY. DOCKET NO.

7913Z

SERIAL NO.

580,246

APPLICANT

Donald R. Huffman, et al.

FILING DATE

September 10, 1990

GROUP

**U.S. PATENT DOCUMENTS**

*EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
AA						
AB						
AC						
AD						
AE						
AF						
AG						
AH						
AI						
AJ						
AK						

**FOREIGN PATENT DOCUMENTS**

	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
						YES	NO
AL							
AM							
AN							
AO							
AP							

**OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)**

561C	AR	Hess, Jr., et al., The Stability of Footballene, J. Org. Chem, 1986, pp. 3902-3903
	AS	Rosen, et al., Electronic structure of spheroidal metal containing carbon shells: study of the LaC <sub>60</sub> and C <sub>60</sub> clusters and their ions within the local density approximation,
	AT	Z. Phys. D-Atoms, Molecules and Clusters, pp. 387-390, 1989

EXAMINER

*E. J. [Signature]*

DATE CONSIDERED

8/17/92

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

LIST OF PRIOR ART CITED BY APPLICANT  
(Use several sheets if necessary)ATTY. DOCKET NO.  
7913ZSERIAL NO.  
5807246APPLICANT  
Donald R. Huffman, et al.FILING DATE  
September 10, 1990

GROUP

## U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	AA						
	AB						
	AC						
	AD						
	AE						
	AF						
	AG						
	AH						
	AI						
	AJ						
	AK						

## FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
							YES	NO
	AL							
	AM							
	AN							
	AO							
	AP							

## OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)

56-1C	AR	Harter, et al., Rotation-vibration spectra of icosahedral molecules. I. Icosahedral symmetry analysis and fine structure, J. Chem. Phys. 90(9), May 1989, pp. 4727-4743
	AS	Weeks, et al., Rotation-vibration spectra of icosahedral molecules. II. Icosahedral symmetry, vibrational eigenfrequencies, and normal modes of buckminsterfullerene, J. Chem. Phys. 90(9), May 1989 pp. 4744-4771
	AT	

EXAMINER

DATE CONSIDERED

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.



FORM PTO-1449 (REV. 7-90)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		Sheet <u>17</u> of <u>56</u>	
LIST OF PRIOR ART CITED BY APPLICANT (Use several sheets if necessary)				ATTY. DOCKET NO. 7913Z	
				SERIAL NO. 580,246	
				APPLICANT Donald R. Huffman, et al.	
				FILING DATE September 10, 1990	
				GROUP	

U.S. PATENT DOCUMENTS									
EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE			
AA									
AB									
AC									
AD									
AE									
AF									
AG									
AH									
AI									
AJ									
AK									

FOREIGN PATENT DOCUMENTS									
DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION				
					YES	NO			
AL									
AM									
AN									
AO									
AP									

OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)		
56-11	AR	Dias, A Facile Huckel Molecular Orbital Solution of Buckminsterfullene Using Chemical Graph Theory, Journal of Chemical Education, Vol. 66, No. 12, December 1989 pp. 1012-1015
	AS	<del>Brendohl, et al., Kekule Structures of Footballene, Journal of Molecular Structure (Theochem), 188 (1989) pp. 55-66</del>
	AT	<del>Parent, et al., Investigations of Small Carbon Cluster Ion Structures by Reactions with HCN, J. Am. Chem. Soc. 1989, 111, pp. 2393-2401</del>

EXAMINER 	DATE CONSIDERED 8/17/92
--------------	----------------------------

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

LIST OF PRIOR-ART CITED BY APPLICANT  
(Use several sheets if necessary)

APPLICANT  
Donald R. Huffman, et al.

FILING DATE  
September 10, 1990

GROUP

U.S. PATENT DOCUMENTS

EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
AA						
AB						
AC						
AD						
AE						
AF						
AG						
AH						
AI						
AJ						
AK						

FOREIGN PATENT DOCUMENTS

DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES NO
AL					
AM					
AN					
AO					
AP					

OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)

AR	<del>Lineman, et al., High-Mass Carbon Clusters from Aromatic Hydrocarbons Observed by Laser-Mass Spectrometry, J. Phys. Chem. 1989, 93, pp. 5025-5026</del>
AS	<del>Clarina, et al., Quantum Chemically Supported Vibrational Analysis of Giant Molecules: The C<sub>60</sub> and C<sub>70</sub> Clusters, Journal of Molecular Structure (Thechem), 202 (1989), pp. 169-176</del>
AT	<del>Somerville, et al., An astronomical search for the molecule C<sub>60</sub>, Mon. Nat. R. ast. Soc. (1989) 240, Short Communication, pp. 41p-46p</del>

EXAMINER

*[Signature]*

DATE CONSIDERED

8/17/92

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

## LIST OF PRIOR ART CITED BY APPLICANT

(Use several sheets if necessary)

ATTY. DOCKET NO.

7913Z

SERIAL NO.

580,246

APPLICANT

Donald R. Huffman, et al.

FILING DATE

September 10, 1990

GROUP

## U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	AA						
	AB						
	AC						
	AD						
	AE						
	AF						
	AG						
	AH						
	AI						
	AJ						
	AK						

## FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
							YES	NO
	AL							
	AM							
	AN							
	AO							
	AP							

## OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)

5610	AR	Ballester, et al., Atoms in Carbon Cages as a Source of Interstellar Diffuse Lines, The Astrophysical Journal 356 pp. 507-512, June 20, 1990
5610	AS	Oreasy, et al., Formation of high mass carbon cluster ions from laser ablation of polymers and thin carbon films, J. Chem. Phys. 92(4) February 15, 1990, pp. 2269-2277
	AT	Feld, et al., Carbon Cluster Emission from Polymers under Kiloelectronvolt and Mega-electronvolt Ion Bombardment, J. Phys. Chem. 1990, 94, 4595-4599

EXAMINER

*Shubichoff*

DATE CONSIDERED

8/17/92

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

**LIST OF PRIOR ART CITED BY APPLICANT**  
(Use several sheets if necessary)

ATTY. DOCKET NO.

7913Z

SERIAL NO.

580,246

12:54

APPLICANT

Donald R. Huffman, et al.

FILING DATE

September 10, 1990

GROUP

**U.S. PATENT DOCUMENTS**

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	AA						
	AB						
	AC						
	AD						
	AE						
	AF						
	AG						
	AH						
	AI						
	AJ						
	AK						

**FOREIGN PATENT DOCUMENTS**

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES NO
	AL						
	AM						
	AN						
	AO						
	AP						

**OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)**

50-16	AR		Fowler, et al., Electric and Magnetic Properties of the Aromatic Sixty-Carbon Cage, Chemical Physics Letters, Volume 165, number 1, January 5, 1990, pp. 79-86
50-16	AS		Oulemans, et al., The Jahn-Teller instability of fivefold degenerate states in icosahedral molecules, J. Chem. Phys. 93(2), July 15, 1990, pp. 1221-1234
50-16	AT		Haddon, et al., Icosahedral C <sub>60</sub> Revisited: An Aromatic Molecule with a Vanishingly Small Ring Current Magnetic Susceptibility, Chemical Physics Letters, Vol. 169, No. 4, June 8, 1990, pp. 362-364

EXAMINER

*[Signature]*

DATE CONSIDERED

8/17/92

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

**LIST OF PRIOR ART CITED BY APPLICANT**  
(Use several sheets if necessary)

ATTY. DOCKET NO.  
7913Z

SERIAL NO.  
580,246

APPLICANT  
Donald R. Huffman, et al.

FILING DATE  
September 10, 1990

GROUP

**U.S. PATENT DOCUMENTS**

EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
AA						
AB						
AC						
AD						
AE						
AF						
AG						
AH						
AI						
AJ						
AK						

**FOREIGN PATENT DOCUMENTS**

DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES NO
AL					
AM					
AN					
AO					
AP					

**OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)**

561	AR	Joblin, et al., Detection of diffuse interstellar bands in the infrared, Nature, Vol. 346, August 23, 1990, pp. 729-731
	AS	<del>Amis, et al., On the Lack of Reactivity of Buckminsterfullerene: A Theoretical Study, J. Chem. Soc. Perkin Trans., 1990, pp. 1595-1598</del>
561	AT	Harano, et al., Decomposition of gaseous hydrocarbons in a laser-induced plasma as a novel carbonaceous source for cluster formation, Chemical Physics Letters, volume 172, number 3,4 September 7, 1990, pp. 219-223

EXAMINER

*Shadrach*

DATE CONSIDERED

8/17/92

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

FORM PTO-1449 (REV. 7-89)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		Sheet <u>22</u> of <u>56</u>	
<b>LIST OF PRIOR ART CITED BY APPLICANT</b> (Use separate sheets if necessary)				ATTY. DOCKET NO. 7913Z	
				SERIAL NO. 580,246	
				APPLICANT Donald R. Huffman, et al.	
				FILING DATE September 10, 1990	
				GROUP	

U.S. PATENT DOCUMENTS							
EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	AA						
	AB						
	AC						
	AD						
	AE						
	AF						
	AG						
	AH						
	AI						
	AJ						
	AK						

FOREIGN PATENT DOCUMENTS							
		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION
							YES NO
	AL						
	AM						
	AN						
	AO						
	AP						

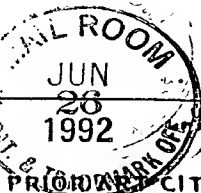
  

OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)		
5615	AR	Yang, et al., Ups of 2-30-Atom Carbon Clusters: Chains and Rings, Chemical Physics Letters, Volume 144, number 5,6, pp. 431-436 <u>3/11/88</u>
5616	AS	Rosen, et al., First-Principle Calculations of the Ionization Potentials and Electron Affinities of the Spheroidal Molecules C <sub>60</sub> and LaC <sub>60</sub> , J. Am. Chem. Soc., 1988, 110, pp. 8701-8703
5617	AT	Brendedal, et al., Normal Coordinate Analysis of "Footballene" C <sub>60</sub> , Spectroscopy Letters, 21(4), 1988, pp. 313-318

EXAMINER <i>Halvick</i>	DATE CONSIDERED <u>8/17/92</u>
----------------------------	-----------------------------------

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

FORM PTO-1449  
(REV. 7-90)U.S. DEPARTMENT OF COMMERCE  
PATENT AND TRADEMARK OFFICE

ATTY. DOCKET NO.

7913Z

Sheet 23 of 56

SERIAL NO.

580,246

## LIST OF PRIOR ART CITED BY APPLICANT

(Use several sheets if necessary)

APPLICANT

Donald R. Huffman, et al.

FILING DATE

September 10, 1990

GROUP

## U.S. PATENT DOCUMENTS

EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
AA						
AB						
AC						
AD						
AE						
AF						
AG						
AH						
AI						
AJ						
AK						

## FOREIGN PATENT DOCUMENTS

	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
						YES	NO
AL							
AM							
AN							
AO							
AP							

## OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)

5 AR	AR	Brendschal, Symmetry Coordinates of Molecular Vibrations of "Footballene" $C_{60}$ , Spectroscopy Letters, 21(4), 1988, pp. 319-339
	AS	<del>Haddon, Measure of Nonplanarity in Conjugated Organic Molecules: Which Structurally-Characterized Molecule Displays the Highest Degree of Pyramidalization?, J. Am. Chem. Soc., 1990, 112, pp. 3305-3309</del>
	AT	<del>Fowler, Carbon Cylinders: A Class of Closed-shell Clusters, J. Chem. Soc. Faraday Trans. 1990, 86(2), pp. 2073-2077</del>

EXAMINER

*Shelton*

DATE CONSIDERED

8/17/92

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.



7913Z

SERIAL NO.

580,246 5112: 54

## LIST OF PRIOR ART CITED BY APPLICANT

(Use several sheets if necessary)

APPLICANT

Donald R. Huffman, et al.

FILING DATE

September 10, 1990

GROUP

## U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	AA						
	AB						
	AC						
	AD						
	AE						
	AF						
	AG						
	AH						
	AI						
	AJ						
	AK						

## FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
							YES	NO
	AL							
	AM							
	AN							
	AO							
	AP							

## OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)

5G-K	AR	<del>jiang, et al., Stability and reactivities based on moment analysis, Theor. Chim. Acta-</del>
		<del>(1989) 75: pp. 279-297</del>
5G-K	AS	Oeulmans, et al., SO(4) symmetry and the static Jahn-Teller effect in icosahedral molecules, Physical Review A, Volume 39, Number 2, January 15, 1989, pp. 481-493
	AT	Rosen, et al., Calculations of the ionization thresholds and electron affinities of the neutral, positively and negatively charged C <sub>60</sub> -"fullene-60", J. Chem. Phys. 90(4), February 15, 1989, pp. 2525-2526

EXAMINER

*H. Smith*

DATE CONSIDERED

8/17/92

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.



**LIST OF PRIOR ART CITED BY APPLICANT**  
(Use several sheets if necessary)

ATTY. DOCKET NO.

7913Z

SERIAL NO.

5807246 12:55

APPLICANT

Donald R. Huffman, et al.

FILING DATE

September 10, 1990

GROUP

**U.S. PATENT DOCUMENTS**

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	AA						
	AB						
	AC						
	AD						
	AE						
	AF						
	AG						
	AH						
	AI						
	AJ						
	AK						

**FOREIGN PATENT DOCUMENTS**

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
							YES	NO
	AL							
	AM							
	AN							
	AO							
	AP							

**OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)**

	AR	<del>Slanina, et al., On Relative Stability Reasoning for Clusters of Different Dimensions: An</del>
		<del>Illustration with the C<sub>60</sub>-C<sub>70</sub> System, Thermochimica Acta, 140 (1989) pp. 87-95</del>
5610	AS	Campbell, et al., An intense, simple carbon cluster source, J. Chem. Phys. 93(9), November 1, 1990, pp. 6900-6907
5610	AT	Rohlfing, et al., Two-color pyrometric imaging of laser-heated carbon particles in a supersonic flow, Chemical Physics Letters, volume 170, number 1, June 29, 1990, pp. 44-50

EXAMINER

*Shelvin*

DATE CONSIDERED

8/17/92

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

FORM PTO-1449 (REV. 7-90)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		ATTY. DOCKET NO. 7913Z		SERIAL NO. 580,246 1.12:55	
<b>LIST OF PRIOR ART CITED BY APPLICANT</b> (Use several sheets if necessary)				APPLICANT Donald R. Huffman, et al.		FILING DATE September 10, 1990	
<b>U.S. PATENT DOCUMENTS</b>							
EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE	
	AA						
	AB						
	AC						
	AD						
	AE						
	AF						
	AG						
	AH						
	AI						
	AJ						
	AK						
<b>FOREIGN PATENT DOCUMENTS</b>							
	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
	AL					YES	NO
	AM						
	AN						
	AO						
	AP						
<b>OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)</b>							
5611	AR	Hale, Discrete-Variational-X alpha Electronic Structure Studies of the Spherical C <sub>60</sub> Cluster: Prediction of Ionization Potential and Electronic Transition Energy, J. Am. Chem. Soc. 1986, 108, pp. 6087-6088					
5611	AS	Satpathy, Electronic Structure of the Truncated-Icosahedral C <sub>60</sub> Cluster, Chemical Physics Letters, volume 130, number 6, October 24, 1986, pp. 545-550					
5611	AT	Rablizirow, The Role of Cavities and Mantles in the Ultraviolet Extinction Peak of Graphite Spheres with Particular Reference to a Possibly Discovered C <sub>60</sub> Structure, Astrophysics and Space Science 125 (1986), pp. 331-339					
EXAMINER 			DATE CONSIDERED 8/17/92				
*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.							

FORM PTO-1449  
(REV. 7-89)U.S. DEPARTMENT OF COMMERCE  
PATENT AND TRADEMARK OFFICE

ATTY. DOCKET NO.

7913Z

Sheet 27 of 56

SERIAL NO.

580,246

112:55

## LIST OF PRIOR ART CITED BY APPLICANT

(Use several sheets if necessary)

APPLICANT

Donald R. Huffman, et al.

FILING DATE

September 10, 1990

GROUP

## U.S. PATENT DOCUMENTS

*EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	AA						
	AB						
	AC						
	AD						
	AE						
	AF						
	AG						
	AH						
	AI						
	AJ						
	AK						

## FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
							YES	NO
	AL							
	AM							
	AN							
	AO							
	AP							

## OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)

56-11	AR	Cox, et al., C <sub>60</sub> La: A Deflated Soccer Ball?, J. Am. Chem. Soc. 1986, 108, pp. 2457-2458
56-11	AS	Disch, et al., On Symmetrical Clusters of Carbon Atoms: C <sub>60</sub> , Chemical Physics Letters, Volume 125, number 5,6, April 18, 1986, pp. 465-466
56-11	AT	Fowler, et al., $\pi$ -Systems in Three Dimensions, Chemical Physics Letters, Volume 127, number 1, May 30, 1986, pp. 78-83

EXAMINER

*Shubert*

DATE CONSIDERED

8/17/92

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

7913Z

SEP 12 1990 17:12:54

SERIAL NO.

580,246

APPLICANT

Donald R. Huffman, et al.

FILING DATE

September 10, 1990

GROUP

LIST OF PRIOR ART CITED BY APPLICANT

(Use several sheets if necessary)

U.S. PATENT DOCUMENTS

EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
AA						
AB						
AC						
AD						
AE						
AF						
AG						
AH						
AI						
AJ						
AK						

FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER							DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
													YES	NO
	AL													
	AM													
	AN													
	AO													
	AP													

OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)

56-11	AR	Ozaki, et al., On Electronic States and Bond Lengths of the Truncated Icosahedral C <sub>60</sub> Molecule, Chemical Physics Letters, Volume 127, number 3, June 13, 1986, pp. 242-244
	AS	Newton, et al., Stability of Buckminsterfullerene and Related Carbon Clusters, J. Am. Chem. Soc., 1986, 108, pp. 2469-2470
56-11	AT	Haddon, et al., Electronic Structure and Bonding in Icosahedral C <sub>60</sub> , Chemical Physics Letters, Volume 125, number 5,6, April 18, 1986, pp. 459-464

EXAMINER

*[Signature]*

DATE CONSIDERED

8/17/92

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

FORM PTO-1449 REV. 7-89		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		Sheet <u>29</u> of <u>56</u>	
<b>LIST OF PRIOR ART CITED BY APPLICANT</b> (Use several sheets if necessary)				ATTY. DOCKET NO. <b>7913Z</b>	
				SERIAL NO. <b>580,246</b>	
				APPLICANT <b>Donald R. Huffman, et al.</b>	
FILING DATE <b>September 10, 1990</b>				GROUP	

U.S. PATENT DOCUMENTS													
EXAMINER INITIAL		DOCUMENT NUMBER							DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	AA												
	AB												
	AC												
	AD												
	AE												
	AF												
	AG												
	AH												
	AI												
	AJ												
	AK												

FOREIGN PATENT DOCUMENTS															
		DOCUMENT NUMBER							DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION		
														YES	NO
	AL														
	AM														
	AN														
	AO														
	AP														

OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)		
561C	AR	Haymet, Footballene: A Theoretical Prediction for the Stable, Truncated Icosahedral Molecule C <sub>60</sub> , J. Am. Chem. Soc. 1986, 108, pp. 319-321
561C	AS	Haymet, C <sub>120</sub> and C <sub>60</sub> : Archimedean Solids Constructed from sp <sup>2</sup> Hybridized Carbon Atoms, Chemical Physics Letters, Volume 122, number 5, December 20, 1985, pp. 421-424
561C	AT	Leger, et al., Identification of the "unidentified IR emission features of interstellar dust?" Astron. Astrophys. 137, (1986), pp. L5-L8

EXAMINER 	DATE CONSIDERED <b>8/17/92</b>
--------------	-----------------------------------

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

ROOM  
JUN 26 1992

U.S. DEPARTMENT OF COMMERCE  
PATENT AND TRADEMARK OFFICE

Sheet 30 of 56

LIST OF PRIOR ART CITED BY APPLICANT  
(Underline references if necessary)

ATTY. DOCKET NO.

7913Z

SERIAL NO.

580,246

APPLICANT

Donald R. Huffman, et al.

FILING DATE

September 10, 1990

GROUP

U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	AA						
	AB						
	AC						
	AD						
	AE						
	AF						
	AG						
	AH						
	AI						
	AJ						
	AK						

FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
							YES	NO
	AL							
	AM							
	AN							
	AO							
	AP							

OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)

56X	AR	Stankevich, et al., The Structural Chemistry of Crystalline Carbon: Geometry, Stability, and Electronic Spectrum, Russian Chemical Reviews, 53(7), 1984, pp. 640-655
561C	AS	Klein, et al, Resonance in C <sub>60</sub> Buckminsterfullerene, J. Am. Chem. Soc. 1986, 108, pp. 1301-1302
561C	AT	Jelski, et al., Clusters: Link between Molecules and Solids, Journal of Chemical Education, Volume 65, Number 10, October 1988, pp. 879-883

EXAMINER

*Shelvin*

DATE CONSIDERED

8/17/92

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

FORM PTO-117  
(REV. 7-90)U.S. DEPARTMENT OF COMMERCE  
PATENT AND TRADEMARK OFFICE

ATTY. DOCKET NO.

Sheet 31 of 56

SERIAL NO.

7913Z

580,246

APPLICANT

Donald R. Huffman, et al.

FILING DATE

September 10, 1990

GROUP

## LIST OF PRIOR ART CITED BY APPLICANT

(Use several sheets if necessary)

## U.S. PATENT DOCUMENTS

EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
AA						
AB						
AC						
AD						
AE						
AF						
AG						
AH						
AI						
AJ						
AK						

## FOREIGN PATENT DOCUMENTS

	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
						YES	NO
AL							
AM							
AN							
AO							
AP							

## OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)

	AR	<del>Feng, et al., Quantum chemical Investigation of Buckminsterfullerene and Related Carbon Clusters</del>
		<del>(I): The Electronic Structure and UV Spectra of Buckminsterfullerene, and other C<sub>60</sub> Cages,</del>
		<del>International Journal of Quantum Chemistry, Vol. XXVII, 1990, pp. 509-607</del>
SGR	AS	Creasy, ... Some model calculations of carbon cluster growth kinetics, J. Chem. Phys.
		92(12), June 15, 1990, pp. 7223-7233
	AT	<del>Laszlo, et al., A Study of the UV Spectrum of the Truncated Icosahedral C<sub>60</sub> Molecule,</del>
		<del>Journal of Molecular Structure (Theochim), 183, 1989, pp. 271-278</del>

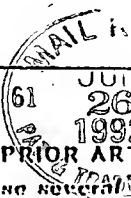
EXAMINER

*Shadrach*

DATE CONSIDERED

*8/17/92*

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.



**LIST OF PRIOR ART CITED BY APPLICANT**  
(Use several sheets if necessary)

ATTY. DOCKET NO.

7913Z

SERIAL NO.

580,246

APPLICANT

Donald R. Huffman, et al.

FILING DATE

September 10, 1990

GROUP

**U.S. PATENT DOCUMENTS**

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	AA						
	AB						
	AC						
	AD						
	AE						
	AF						
	AG						
	AH						
	AI						
	AJ						
	AK						

**FOREIGN PATENT DOCUMENTS**

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
							YES	NO
	AL							
	AM							
	AN							
	AO							
	AP							

**OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)**

56-6	AR	Wu, et al., Vibrational Motions of Buckminsterfullerene, Chemical Physics Letters, Volume 137, number 3, June 12, 1987, pp. 291-294
56-11	AS	Lefevre, An Experimental Study of the Dust of Iron, Carbon, Silicon Carbide and Silica, Astron. & Astrophys. Volume 5, No. 1, 1970 pp. 37-44
56-11	AT	Kroto, et al., The formation of quasi-icosahedral spiral shell carbon particles, Nature, Vol. 331, January 28, 1988, pp. 328-331

EXAMINER

*Shelton*

DATE CONSIDERED

8/17/92

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.



61 JUL 26 1992  
PAT. & TRADEMARK OFFICE

Form PTO-1449  
(REV. 7-80)

U.S. DEPARTMENT OF COMMERCE  
PATENT AND TRADEMARK OFFICE

Sheet 33 of 56

**LIST OF PRIOR ART CITED BY APPLICANT**  
(Use several sheets if necessary)

ATTY. DOCKET NO. 7913Z	SERIAL NO. 580,246
APPLICANT Donald R. Huffman, et al.	
FILED DATE September 10, 1990	GROUP

**U.S. PATENT DOCUMENTS**

EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILED DATE IF APPROPRIATE
	AA					
	AB					
	AC					
	AD					
	AE					
	AF					
	AG					
	AH					
	AI					
	AJ					
	AK					

**FOREIGN PATENT DOCUMENTS**

FOREIGN PATENT DOCUMENTS														
		DOCUMENT NUMBER							DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
													YES	NO
	AL													
	AM													
	AN													
	AO													
	AP													

**OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)**

581	AR	Gerhardt, et al., Polyhedral Carbon Ions in Hydrocarbon Flames, Chemical Physics Letters, Volume 137, number 4, June 19, 1987, pp. 306-310
581	AS	Yang, et al., Ups of Buckminsterfullerene and Other Large Clusters of Carbon, Chemical Physics Letters, Volume 139, number 3,4, August 28, 1987 pp. 233-239
	AT	Wilcox, Jr., Extraction with Solvents, Experimental Organic Chemistry, pp. 79-80

EXAMINER <i>[Signature]</i>	DATE CONSIDERED 8/17/92
--------------------------------	----------------------------

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

LIST OF PRIOR ART CITED BY APPLICANT  
(Use several sheets if necessary)

ATTY. DOCKET NO.

SERIAL NO.

7913Z

580,246 12:50

APPLICANT

Donald R. Huffman, et al.

FILING DATE

September 10, 1990

GROUP

## U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	AA						
	AB						
	AC						
	AD						
	AE						
	AF						
	AG						
	AH						
	AI						
	AJ						
	AK						

## FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
							YES	NO
	AL							
	AM							
	AN							
	AO							
	AP							

## OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)

561	AR		Kroto, Space, Stars, C <sub>60</sub> , and Soot, Science, November 25, 1988, pp. 1139-1145
56K	AS		Kroto, Giant fullerenes, Chemistry in Britain, January 1990, pp. 40-45
56K	AT		Russoletti, et al., Experiments on Cosmic Dust Analogues, Volume 149 Proceedings, pp. 25-42 (1987)

EXAMINER

*Speluch*

DATE CONSIDERED

8/17/92

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

JUN 26 1990

Form PTO-1449  
REV. 1-89U.S. DEPARTMENT OF COMMERCE  
PATENT AND TRADEMARK OFFICE

Sheet 35 of 56

LIST OF PRIOR ART CITED BY APPLICANT  
(Use several sheets if necessary)

ATTY. DOCKET NO.

7913Z

SERIAL NO.

580,246

APPLICANT

Donald R. Huffman, et al.

FILING DATE

September 10, 1990

GROUP

## U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	AA						
	AB						
	AC						
	AD						
	AE						
	AF						
	AG						
	AH						
	AI						
	AJ						
	AK						

## FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
							YES	NO
	AL							
	AM							
	AN							
	AO							
	AP							

## OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)

	AR	<del>Ruscoletti, Dusty Objects in the Universe, pp. 89-93</del>
901	AS	Vinokur, et al., Measured Extinction Efficiency of Graphite Smoke in the Region 1200-6000A, Nature Physical Science, Vol. 243, May 21, 1973, pp. 50-51
	AT	<del>Hargittai, et al., Quasicrystals, Networks, and Molecules of Fivefold Symmetry, pp. 239-287</del>

EXAMINER

*H. Schubert*

DATE CONSIDERED

8/17/92

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

Form PTO-1449  
REV. 7-89U.S. DEPARTMENT OF COMMERCE  
PATENT AND TRADEMARK OFFICE

Sheet 36 of 56

## LIST OF PRIOR ART CITED BY APPLICANT

(Use several sheets if necessary)

ATTY. DOCKET NO.

7913Z

SERIAL NO.

1,580,246 55

APPLICANT

Donald R. Huffman, et al.

FILING DATE

September 10, 1990

GROUP

## U.S. PATENT DOCUMENTS

EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
AA						
AB						
AC						
AD						
AE						
AF						
AG						
AH						
AI						
AJ						
AK						

## FOREIGN PATENT DOCUMENTS

	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
						YES	NO
AL							
AM							
AN							
AO							
AP							

## OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)

SGK	AR	Kroto, The chemistry of the interstellar medium, Phil. Trans. R. Soc. Lond. A 325, 1988, pp. 405-421
	AS	<del>Paquette, Dodecahedranes and Allied Spherical Molecules, Chem. Rev. 1989, pp. 1051-1065</del>
SGK	AT	Kaldor, et al., Molecular Surfaces: Chemistry and Physics of Gas Phase Clusters, Microclusters: Proceedings of the First NEC Symposium, 1987, pp. 96-106

EXAMINER

*E. K. Schmitt*

DATE CONSIDERED

*8/17/92*

\* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.



FORM PTO-1449  
REV. 7-89

U.S. DEPARTMENT OF COMMERCE  
PATENT AND TRADEMARK OFFICE

ATTY. DOCKET NO.

SHEET 37 of 56

SERIAL NO.  
580,246

7913Z

APPLICANT

Donald R. Huffman, et al.

FILING DATE

September 10, 1990

GROUP

LIST OF PRIOR ART CITED BY APPLICANT

(Use several sheets if necessary)

U.S. PATENT DOCUMENTS

*EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	AA						
	AB						
	AC						
	AD						
	AE						
	AF						
	AG						
	AH						
	AI						
	AJ						
	AK						

FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
							YES	NO
	AL							
	AM							
	AN							
	AO							
	AP							

OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)

561C	AR	Kratschmer, et al., The infrared and ultraviolet absorption spectra of laboratory-produced carbon dust: evidence for the presence of the $C_{60}$ molecule, Chemical Physics Letters, Volume 170, number 2,3, July 6, 1990
	AS	<del>Taylor, et al., Isolation, Separation and Characterisation of the Fullerenes <math>C_{60}</math> and <math>C_{70}</math>. The Third Form of Carbon, J. Chem. Soc., Chem. Commun., 1990</del>
561C	AT	Orl, et al., Probing $C_{60}$ , Science, Vol. 242, November 13, 1988, pp. 1017-1022

EXAMINER

*[Signature]*

DATE CONSIDERED

8/17/92

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

LIST OF PRIOR ART CITED BY APPLICANT

(Use several sheets if necessary)

ATTY. DOCKET NO.

7913Z

SERIAL NO.

580,246

APPLICANT

Donald R. Huffman, et al.

FILING DATE

September 10, 1990

GROUP

U.S. PATENT DOCUMENTS

EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
AA						
AB						
AC						
AD						
AE						
AF						
AG						
AH						
AI						
AJ						
AK						

FOREIGN PATENT DOCUMENTS

DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES NO
AL					
AM					
AN					
AO					
AP					

OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)

56K	AR	Kruto, Chains and Grains in Interstellar Space, Polycyclic Aromatic Hydrocarbons and Astrophysics, pp. 197-206 (1987)
	AS	<del>Shalley, Down to Earth Studies of Carbon Clusters, Carbon in the Galaxy: Studies from Earth and Space, NASA Conference Publication 3061, 1990, 199-244</del>
	AT	<del>Kruto, The Formation and Structure of Circumstellar and Interstellar Dust, Carbon in the Galaxy: Studies from Earth and Space, NASA Conference Publication 3061, pp. 275-284</del>

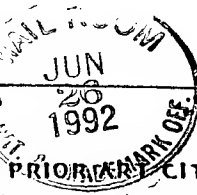
EXAMINER

*H. H. H.*

DATE CONSIDERED

8/17/92

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.



U.S. DEPARTMENT OF COMMERCE  
PATENT AND TRADEMARK OFFICE

Sheet 39 of 56

**LIST OF PRIOR ART CITED BY APPLICANT**  
(Use several sheets if necessary)

ATTY. DOCKET NO.

79132

SERIAL NO.

580,246

APPLICANT

Donald R. Huffman, et al.

FILING DATE

September 10, 1990

GROUP

**U.S. PATENT DOCUMENTS**

EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
AA						
AB						
AC						
AD						
AE						
AF						
AG						
AH						
AI						
AJ						
AK						

**FOREIGN PATENT DOCUMENTS**

YEAR DOCUMENTS														
		DOCUMENT NUMBER							DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
												YES	NO	
	AL													
	AM													
	AN													
	AO													
	AP													

**OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)**

56-K	AR	Hahn, et al., Magic Numbers in $C_4$ and $C_5$ Abundance Distributions, Chemical Physics Letters, Volume 130, number 1,2, September 26, 1986, pp. 12-16
56-K	AS	O'Keefe, et al., Production of Large Carbon Cluster Ions by Laser Vaporization, Chemical Physics Letters, Volume 130, number 1,2, September 26, 1986, pp. 17-19
56-K	AT	Klein, et al., Icosahedral symmetry carbon cage molecules, Nature, Volume 323, October 23, 1986, pp. 703-706

EXAMINER

*St. John*

DATE CONSIDERED

8/17/92

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

Form PTO-1449  
(REV. 7-1981)U.S. DEPARTMENT OF COMMERCE  
PATENT AND TRADEMARK OFFICE

Sheet 40 of 56

## LIST OF PRIOR ART CITED BY APPLICANT

(Use several sheets if necessary)

ATTY. DOCKET NO.

7913Z

SERIAL NO.

580,246

APPLICANT

Donald R. Huffman, et al.

FILING DATE

September 10, 1990

GROUP

## U.S. PATENT DOCUMENTS

EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
AA						
AB						
AC						
AD						
AE						
AF						
AG						
AH						
AI						
AJ						
AK						

## FOREIGN PATENT DOCUMENTS

	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
						YES	NO
AL							
AM							
AN							
AO							
AP							

## OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)

56K	AR	Stone, et al., Theoretical Studies of Icosahedral $C_{60}$ and Some Related Species, Chemical Physics Letters, Volume 128, number 5,6, August 8, 1986, pp. 501-503
56K	AS	McElvany, et al., Ion-molecule reaction studies of mass selected carbon cluster ions formed by laser vaporization, J. Chem. Phys. 85(1), July 1, 1986, pp. 632-633
56K	AT	Liu, et al., Negative Carbon Cluster Ion Beams: New Evidence for the Special Nature of $C_{60}$ , Chemical Physics Letters, Volume 126, number 2, May 2, 1986, pp. 215-217

EXAMINER

DATE CONSIDERED

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.





FORM PTO-1449  
(REV. 7-90)

U.S. DEPARTMENT OF COMMERCE  
PATENT AND TRADEMARK OFFICE

ATTY. DOCKET NO.

7913Z

SERIAL NO.

580,246

56

LIST OF PRIOR ART CITED BY APPLICANT

(Use several sheets if necessary)

APPLICANT

Donald R. Huffman, et al.

FILING DATE

September 10, 1990

GROUP

U.S. PATENT DOCUMENTS

*EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	AA						
	AB						
	AC						
	AD						
	AE						
	AF						
	AG						
	AH						
	AI						
	AJ						
	AK						

FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
							YES	NO
	AL							
	AM							
	AN							
	AO							
	AP							

OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)

56-11	AR	Zhang, et al., Reactivity of Large Carbon Clusters: Spheroidal Carbon Shells and their Possible Relevance to the Formation and Morphology of Soot, The Journal of Physical Chemistry, Volume 90, number 4, February 13, 1986, pp. 525-528
56-11	AS	Heath, et al., Lanthanum Complexes of Spheroidal Carbon Shells, J. Am. Chem. Soc., 1985, 107, pp. 7779-7780
56-11	AT	Kroto, et al., C <sub>60</sub> : Buckminsterfullerene, Nature, Vol. 318, November 14, 1985, pp. 162-163

EXAMINER

*S. H. Lin*

DATE CONSIDERED

9/17/92

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

FORM PTO-1449  
REV. 7-901U.S. DEPARTMENT OF COMMERCE  
PATENT AND TRADEMARK OFFICE

Sheet 42 of 56

## LIST OF PRIOR ART CITED BY APPLICANT

(Use several sheets if necessary)

ATTY. DOCKET NO.

SERIAL NO.

7913Z

2:580,246

APPLICANT

Donald R. Huffman, et al.

FILING DATE

GROUP

September 10, 1990

## U.S. PATENT DOCUMENTS

*EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	AA						
	AB						
	AC						
	AD						
	AE						
	AF						
	AG						
	AH						
	AI						
	AJ						
	AK						

## FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
							YES	NO
	AL							
	AM							
	AN							
	AO							
	AP							

## OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)

50-1C	AR	Bloomfield, et al., Negative and Positive Cluster Ions of Carbon and Silicon, Chemical Physics Letters, Volume 121, number 1,2, November 1, 1985, pp. 33-37
50-1	AS	Rohlfing, et al., Production and characterization of supersonic carbon cluster beams, J. Chem. Phys. 81(7), October 1, 1984, pp. 3322-3330
50-1	AT	Dietz, et al., Laser production of supersonic metal cluster beams, J. Chem. Phys. 74(1), June 1, 1981, pp. 6511-6512

EXAMINER

DATE CONSIDERED

8/17/92

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.



FD-1449 (REV. 7-90)

U.S. DEPARTMENT OF COMMERCE  
PATENT AND TRADEMARK OFFICE

ATTY. DOCKET NO.

7913Z

Sheet 43 of 56

SERIAL NO.

1580,24653

LIST OF PRIOR ART CITED BY APPLICANT

(Use several sheets if necessary)

APPLICANT

Donald R. Huffman, et al.

FILING DATE

September 10, 1990

GROUP

U.S. PATENT DOCUMENTS

EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
AA						
AB						
AC						
AD						
AE						
AF						
AG						
AH						
AI						
AJ						
AK						

FOREIGN PATENT DOCUMENTS

	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
						YES	NO
AL							
AM							
AN							
AO							
AP							

OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)

SGR	AR	<del>Kroto, C<sub>60</sub> fullerenes, giant fullerenes and soot, Pure &amp; Appl. Chem. Vol. 62, No. 3, pp. 407-415, 1990</del>
	AS	Kroto, Giant fullerenes, Chemistry in Britain, January 1990, pp. 40-43
	AT	<del>Waltner, Jr., et al., Carbon Molecules, Ions, and Clusters, Chem. Rev. 1989, 89, pp. 1713-1747</del>

EXAMINER

*E. Kalishchell*

DATE CONSIDERED

*8/17/92*

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

7913Z

112586,246

## LIST OF PRIOR ART CITED BY APPLICANT

(Use horizontal lines if necessary)

APPLICANT

Donald R. Huffman, et al.

FILING DATE

September 10, 1990

GROUP

## U.S. PATENT DOCUMENTS

EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
AA						
AB						
AC						
AD						
AE						
AF						
AG						
AH						
AI						
AJ						
AK						

## FOREIGN PATENT DOCUMENTS

	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
						YES	NO
AL							
AM							
AN							
AO							
AP							

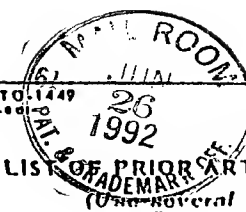
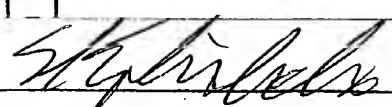
## OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)

56-11	AR	Kroto, Space, Stars, $C_{60}$ and Soot, Science, Vol. 242, November 25, 1988, pp. 1139-1145
56-12	AS	Kroto, The stability of the fullerenes $C_n$ , with $n = 24, 28, 32, 36, 50, 60$ and $70$ , Nature Vol. 329, October 8, 1987, pp. 529-531
	AT	<del>Kratschmer, et al., Search for the UV and IR Spectra of <math>C_{60}</math> in Laboratory-Produced Carbon Dust, Dusty Objects in the Universe, pp. 89-93, 1990</del>

EXAMINER

DATE CONSIDERED

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		ATTY. DOCKET NO. 7913Z		SERIAL NO. 580,246	
LIST OF PRIOR ART CITED BY APPLICANT (Use several sheets if necessary)				APPLICANT Donald R. Huffman, et al.		FILING DATE September 10, 1990	
U.S. PATENT DOCUMENTS							
EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	AA						
	AB						
	AC						
	AD						
	AE						
	AF						
	AG						
	AH						
	AI						
	AJ						
	AK						
FOREIGN PATENT DOCUMENTS							
		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES NO
	AL						
	AM						
	AN						
	AO						
	AP						
OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)							
56L	AR			Rohlfing, Optical emission studies of atomic, molecular, and particulate carbon produced from a laser vaporization cluster source, J. Chem. Phys. 89(1), November 15, 1988, pp. 6103-6112			
56-11	AS			Creasy, et al., Large Carbon Cluster Ion Formation by Laser Ablation of Polyimide and Graphite, Chemical Physics 126, (1988), pp. 453-468			
56-11	AT			Gerhardt, et al., Large Ionic Species in Sooting Acetylene and Benzene Flames, AGARD Prc. No. 422, Combustion and Fuels in Gas Turbine Origins, pp. 22-1-22-11 (1988)			
EXAMINER				DATE CONSIDERED			
				8/17/92			
*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.							

**LIST OF PRIOR ART CITED BY APPLICANT**  
(Use several sheets if necessary)

ATTY. DOCKET NO.

7913Z

SERIAL NO.

580,246.56

APPLICANT

Donald R. Huffman, et al.

FILING DATE

September 10, 1990

GROUP

**U.S. PATENT DOCUMENTS**

*EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	AA						
	AB						
	AC						
	AD						
	AE						
	AF						
	AG						
	AH						
	AI						
	AJ						
	AK						

**FOREIGN PATENT DOCUMENTS**

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
							YES	NO
	AL							
	AM							
	AN							
	AO							
	AP							

**OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)**

56-1C	AR	Gerhardt, et al., The Formation of Polyhedral Carbon Ions in Fuel-Rich Acetylene and Benzene Flames, Twenty-Second Symposium (International) on Combustion/The Combustion Institute, 1988, pp. 395-401
56-1C	AS	Weiss, et al., Photophysics of Metal Complexes of Spherical Carbon Shells, J. Am. Chem. Soc., 1988, 110, pp. 4464-4465
56-1C	AT	Rohlfing, High resolution time-of-flight mass spectrometry of carbon and carbonaceous clusters, J. Chem. Phys. 93(11), December 1, 1990, pp. 7851-7662

EXAMINER

*Shalvick*

DATE CONSIDERED

8/17/92

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

LIST OF PRIOR ART CITED BY APPLICANT  
(Use appropriate checkmarks if necessary)

ATTY. DOCKET NO.

7913Z

SERIAL NO.

580,246

APPLICANT

Donald R. Huffman, et al.

FILING DATE

September 10, 1990

GROUP

U.S. PATENT DOCUMENTS

*EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	AA						
	AB						
	AC						
	AD						
	AE						
	AF						
	AG						
	AH						
	AI						
	AJ						
	AK						

FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
							YES	NO
	AL							
	AM							
	AN							
	AO							
	AP							

OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)

	AR	<del>So, et al., First Observation of Carbon Aggregate Ions <math>C_{60}^+</math> by Laser Desorption Fourier Transform Mass Spectrometry, J. Phys. Chem. 1989, 93, pp. 1184-1187</del>
	AS	<del>Kroto, The role of linear and spheroidal carbon molecules in interstellar grain formation, Ann. Phys. Fr. 14 (1989) pp. 169-179</del>
	AT	<del>Snow, et al., A search for interstellar and circumstellar <math>C_{60}</math>, Astron. Astrophys. 213, 1989, pp. 291-294</del>

EXAMINER

*[Signature]*

DATE CONSIDERED

8/17/92

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

U.S. DEPARTMENT OF COMMERCE  
PATENT AND TRADEMARK OFFICE

ATTY. DOCKET NO.

SERIAL NO.

7913Z

580,246

APPLICANT

Donald R. Huffman, et al.

FILING DATE

September 10, 1990

GROUP

## LIST OF PRIOR ART CITED BY APPLICANT

(Use several sheets if necessary)

## U.S. PATENT DOCUMENTS

*EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
AA						
AB						
AC						
AD						
AE						
AF						
AG						
AH						
AI						
AJ						
AK						

## FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER							DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
													YES	NO
	AL													
	AM													
	AN													
	AO													
	AP													

## OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)

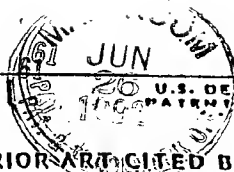
AR	Miller, Buckminsterfullerene - A Molecular Material for the Future?, Adv. Mater. 3, (1991) No. 5, pp. 262-265
AS	Smalley, Supersonic Carbon Cluster Beams, In Atomic and Molecular Clusters, (Elsevier Science 1990) pp. 1-68
AT	Schmalz, et al., C <sub>60</sub> Carbon Cages, Chemical Physics Letters, Volume 130, number 3, October 3, 1986, pp. 203-207

EXAMINER

DATE CONSIDERED

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.





U.S. DEPARTMENT OF COMMERCE  
PATENT AND TRADEMARK OFFICE

ATTY. DOCKET NO.

7913Z

Sheet 49 of 56

SERIAL NO.

580246

LIST OF PRIOR ART CITED BY APPLICANT

(Use several sheets if necessary)

APPLICANT

Donald R. Huffman, et al.

FILING DATE

September 10, 1990

GROUP

U.S. PATENT DOCUMENTS

EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
AA						
AB						
AC						
AD						
AE						
AF						
AG						
AH						
AI						
AJ						
AK						

FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER								DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
														YES	NO
	AL														
	AM														
	AN														
	AO														
	AP														

OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)

56-1C	AR	O'Brien, et al., A Reply to "Magic Numbers in $C_n^+$ and $C_n^-$ Abundance Distributions Based on Experimental Observations, Chemical Physics Letters, Volume 132, number 1, November 28, 1986, pp. 99-102
56-1C	AS	Heymann, Buckminsterfullerene, its Siblings, and Soot, Carriers of Trapped Inert Gases in Meteorites?, Proceedings of the Seventeenth Lunar and Planetary Science Conference, Part 1, Journal of Geophysical Research, Vol. 91, No. B13, November 30, 1986, pp. E135-E138
56-1C	AT	Heath, The Formation of Long Carbon Chain Molecules during Laser Vaporization of Graphite, J. Am. Chem. Soc. 1987, 109, pp. 359-363

EXAMINER

*E. H. Smith*

DATE CONSIDERED

8/17/92

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

7913Z

SERIAL NO.

580,246 56

## LIST OF PRIOR ART CITED BY APPLICANT

(Use several sheets if necessary)

APPLICANT

Donald R. Huffman, et al.

FILING DATE

September 10, 1990

GROUP

## U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	AA						
	AB						
	AC						
	AD						
	AE						
	AF						
	AG						
	AH						
	AI						
	AJ						
	AK						

## FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
							YES	NO
	AL							
	AM							
	AN							
	AO							
	AP							

## OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)

36-11	AR	Heath, et al., Long Carbon Chain Molecules in Circumstellar Shells, The Astrophysical Journal, 314, March 1, 1987, pp. 352-355
20-11	AS	Geusic, et al., Photodissociation of carbon cluster cations, J. Chem. Phys. 86(7), April 1, 1987, pp. 3862-3869
20-11	AT	McElvany, et al., FIMS Studies of Mass-Selected, Large Cluster Ions Produced by Direct Laser Vaporization, Chemical Physics Letters, Volume 134, number 3, February 27, 1987, pp. 214-219

EXAMINER

DATE CONSIDERED

\*EXAMINER: Initial if inference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

**LIST OF PRIOR ART CITED BY APPLICANT**  
(Use several sheets if necessary)

ATTY. DOCKET NO.

7913Z

SERIAL NO.

580,246

APPLICANT

Donald R. Huffman, et al.

FILING DATE

September 10, 1990

GROUP

**U.S. PATENT DOCUMENTS**

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	AA						
	AB						
	AC						
	AD						
	AE						
	AF						
	AG						
	AH						
	AI						
	AJ						
	AK						

**FOREIGN PATENT DOCUMENTS**

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
							YES	NO
	AL							
	AM							
	AN							
	AO							
	AP							

**OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)**

5611	AR	Cyvin, et al., Molecular Vibrations of Footballene, Chemical Physics Letters, Volume 143, number 4, January 22, 1988, pp. 377-380
5611	AS	Radi, et al., A new method for studying carbon clusters in the gas phase: Observation of size specific neutral fragment loss from metastable reactions of mass selected $C_n^+$ , $n < 60$ , J. Chem. Phys. 88(4), February 15, 1988, pp. 2809-2814
5611	AT	Cox, et al., Carbon clusters revisited: The "special" behavior of $C_{60}$ and large carbon clusters J. Chem. Phys., Vol. 88, No. 3, February 1, 1988, pp. 1588-6907

EXAMINER

*[Signature]*

DATE CONSIDERED

8/17/92

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

LIST OF PRIOR ART CITED BY APPLICANT  
(Use several sheets if necessary)

ATTY. DOCKET NO.

7913Z

SERIAL NO.

580,246

APPLICANT

Donald R. Huffman, et al.

FILING DATE

September 10, 1990

GROUP

## U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	AA						
	AB						
	AC						
	AD						
	AE						
	AF						
	AG						
	AH						
	AI						
	AJ						
	AK						

## FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
							YES	NO
	AL							
	AM							
	AN							
	AO							
	AP							


## OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)

5611	AR	Yang, et al., Ups of buckminsterfullerene and other large clusters of Carbon, Chemical Physics Letters, volume 139, number 3,4, August 28, 1987, pp. 233-238
5611	AS	Heath, et al., The UV absorption spectrum of C <sub>60</sub> (buckminsterfullerene): A narrow band at 3860 Å, J. Chem. Phys. 87(7), October 1, 1987, pp. 4236-4238
5611	AT	Kaldor, et al., The basics of molecular surfaces, Chemtech, May 1987, pp. 300-307

EXAMINER

DATE CONSIDERED

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

		Sheet 53 of 56	
FORM PTO-1449 (REV. 7-89)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	
LIST OF PRIOR ART CITED BY APPLICANT (Use reverse sheets if necessary)		ATTY. DOCKET NO. 7913Z	SERIAL NO. 580,246 12:55
		APPLICANT Donald R. Huffman, et al.	
		FILING DATE September 10, 1990	GROUP

U.S. PATENT DOCUMENTS									
EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE			
AA									
AB									
AC									
AD									
AE									
AF									
AG									
AH									
AI									
AJ									
AK									


  

FOREIGN PATENT DOCUMENTS									
	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION			
						YES	NO		
AL									
AM									
AN									
AO									
AP									

OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)		
5611	AR	Iijima, The 60-Carbon Cluster has been Revealed?, J. Phys. Chem. 1987, 91, pp. 3466-3467
5611	AS	Gerhardt, et al., Polyhedral Carbon Ions in Hydrocarbon Flames, Chemical Physical Letters, Volume 137, number 4, June 19, 1987, pp. 306-310
5611	AT	Hollow molecules, New Scientist, November 3, 1966, pp. 118-119

EXAMINER 	DATE CONSIDERED 8/17/92
---	----------------------------

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

LIST OF PRIOR ART CITED BY APPLICANT

(Use several sheets if necessary)

APPLICANT

Donald R. Huffman, et al.

FILING DATE

September 10, 1990

GROUP

U.S. PATENT DOCUMENTS

*EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	AA						
	AB						
	AC						
	AD						
	AE						
	AF						
	AG						
	AH						
	AI						
	AJ						
	AK						

FOREIGN PATENT DOCUMENTS

		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION
							YES NO
	AL						
	AM						
	AN						
	AO						
	AP						

OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)

5611	AR	Daniel, Jr., Studies toward a convergent synthesis of C <sub>60</sub> , Dissertation Abstracts International, vol. 49, no. 5, November 1988, p. 1706-B
5611	AS	Keller, BIT Facaz, 1987, 31, 618-623
5611	AT	Kratschmer and No. Sorg, SPECTROSCOPY OF MATRIX-ISOLATED CARBON CLUSTER MOLECULES BETWEEN 200 AND 850 nm WAVELENGTH, Surface-Science 156 (1985)

EXAMINER

814-821

DATE CONSIDERED

8/17/92

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

**LIST OF PRIOR ART CITED BY APPLICANT**  
(Use several sheets if necessary)

ATTY. DOCKET NO.

7913Z

SERIAL NO.

580,246

APPLICANT

Donald R. Huffman, et al.

FILING DATE

September 10, 1990

GROUP

**U.S. PATENT DOCUMENTS**

EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
AA						
AB						
AC						
AD						
AE						
AF						
AG						
AH						
AI						
AJ						
AK						

**FOREIGN PATENT DOCUMENTS**

		DOCUMENT NUMBER							DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
													YES	NO
	AL													
	AM													
	AN													
	AO													
	AP													

**OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)**

50-11	AR	Kroto et al., C <sub>60</sub> : Buckminsterfullerene, Nature, Volume 318, November 14, 1985 pp. 162-163
50-11	AS	Kirk-Othmer, Encyclopedia of Chemical Technology, Third Edition, Volume 4, Blood, Coagulants and Anticoagulants to Cardiovascular Agents, pp. 652-653 (478)
50-11	AT	Loffler et al., POLYHEDRAL CARBON IONS IN HYDROCARBON FLAMES, Chemical Physics Letters, Volume 137, number 4, June 19, 1987, pp. 306-310

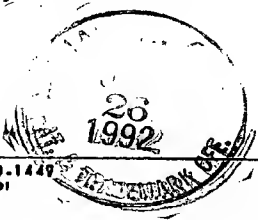
EXAMINER

*[Signature]*

DATE CONSIDERED

8/17/92

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

FORM PTO-1449  
(REV. 7-90)U.S. DEPARTMENT OF COMMERCE  
PATENT AND TRADEMARK OFFICE

Sheet 56 of 56

ATTY. DOCKET NO.

7913Z

SERIAL NO.

15807246

## LIST OF PRIOR ART CITED BY APPLICANT

(Use several sheets if necessary)

APPLICANT

Donald R. Huffman, et al.

FILING DATE

September 10, 1990

GROUP

## U.S. PATENT DOCUMENTS

EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
AA						
AB						
AC						
AD						
AE						
AF						
AG						
AH						
AI						
AJ						
AK						

## FOREIGN PATENT DOCUMENTS

	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
						YES	NO
AL							
AM							
AN							
AO							
AP							

## OTHER PRIOR ART (Including Author, Title, Date, Pertinent Pages, Etc.)

SGA	AR	Zhang et al., REACTIVITY OF LARGE CARBON CLUSTERS: SPHEROIDAL CARBON SHELLS THEIR POSSIBLE RELEVANCE TO THE FORMATION AND MORPHOLOGY OF SOOT, The Journal of Physical Chemistry, Volume 90, Number 4, February 13, 1986, pp. 525-528
SGA	AS	Curl et al., FULLERENES, Scientific American, October 1991, pp. 54-64
SGC	AT	Howard et al., Fullerenes C <sub>60</sub> and C <sub>70</sub> IN FLAMES, Letters to Nature, Volume 352, July 11, 1992, pp. 139-141

EXAMINER

*E. H. Schickel*

DATE CONSIDERED

*8/12/92*

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.